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Journal of the Society of Arts.

FRIDAY, NOVEMBER 14, 1856.

MEETING OF COUNCIL.

Nov. 12TH, 1856.

The Council have determined to appropriate, for the convenience of members, the three lower rooms in the Society's House, hitherto occupied as the Secretary's offices. These rooms will, on and after the commencement of the Session, be available for the use of members, as library and reading room, writing room, &c.

The following schools have been taken into union since the last announcement:—

Queenwood College, Stockbridge, Hants.
The Trade School, Wandsworth.

NOTICE TO MEMBERS.

A letter, announcing the opening of the Session, and enclosing tickets for the admission of members' friends, has been sent to each Member. Any Member not having received the notice and tickets, is requested to inform the Secretary.

APPROXIMATE SOLUTION OF EQUATIONS.

The gentleman who, in May last, anonymously sent £10 to the Society as a prize for this subject, is particularly requested to communicate with the Secretary.

ON IMPROVEMENTS IN MACHINERY AND IN MANUFACTURING PROCESSES, AS AFFECTING THE CONDITION OF THE LABOURERS.

The following is extracted from an address to a section of the recent Philanthropic Congress at Brussels, by Mr. Chadwick, containing statistical facts and observations made from his position as one of a Board of Commissioners for enquiring into labour in manufactories, more particularly on the bearing of improvements in machinery and manufacturing processes on the economical condition and means of labourers, and which was ordered to be printed in the *Moniteur*:—

" You may often see it alleged in Parliament, or in the course of public agitation, that the tendency of improvements in manufacturing machinery and processes, is to injure the labouring classes, and, as a proof, the reduced price paid to the artizan for the production of a given quantity of goods, is commonly put forth.

" The real tendency of manufacturing improvements, as respects the working classes, will, however, be best shown by the facts respecting the progress of Lancashire, our chief manufacturing county. The whole manufacturing tendency in that county, during the last half-century, and before it,—beginning with the displacement of the distaff and then of the spinning wheel—has been to displace hand-labour, by the use of labour-saving machines; yet the more labour that has been displaced by machinery, the more labour has been wanted. Within that half-century the

entire population of the district has more than doubled. Some fabrics, which were consumed almost exclusively by the wealthier classes, were highly paid for in wages, as well as in profits to the manufacturers of them. In particular instances the wages have been reduced, under circumstances which have led to an extended production and consumption by the masses; but the real general progress of the chief manufactures, and of the wages of the entire district, may be illustrated by the following particular instance.

" A partner in one of the chief manufacturing firms in Lancashire wrote to me, as follows, in 1841:— ' The same yarn which cost my father 12d. per lb. in 1792 to make—all by machinery—now costs only 2d. per lb. to make, paying them only 4s. 4d. per head as weekly wages, now 8s. 8d. per head, or more—yet those weekly wages amounted them to 5½d. per lb., and notwithstanding the increase they now amount to only 1d. per lb.' Since 1841, the entire cost of making the yarn has been reduced, and the cost of labour, per lb., has also been reduced; but the average weekly wages have advanced to 9s. per week, and more. The work people, amongst whom these wages are divided, consist chiefly of women and children, not one-fourth of the hands being adult males. Where three members of a family are engaged, the father, mother, and one child, the aggregate wages will now be 27s. per week, or more; that is to say for spinning; but weaving, as well as spinning, is carried on in the same manufactory, and the average wages paid for weaving alone, principally done by young women, are 11s., and, including overseers and all the processes, the average wages of the working people are 13s. a week: that is to say, an average family of three in employment would earn 39s. as weekly wages.

" And, on examining the progress of the manufacture, there appear to be elements ensuring not only the maintenance but the increase of the wages, as being necessary to further improvements of the manufacture—elements which are, to a great extent, independent of the operation of the demand or supply of the ordinary labour.

" The present position of the cotton manufacture, relatively to the most primitive processes, may be thus illustrated:—

" At Calicut, in India, whence *calico* was first brought, or at the foot of the Himalaya mountains, where cotton is grown on the spot, it is spun with the primitive distaff, and it is there woven by a poor Hindoo weaver, who, in the open air, spreads his loom, of a construction as old as the Pharaohs, on which he works for a handful of rice a day, under the shade of a tree, for which he pays no rent. From those same spots, cotton has often been gathered for the supply of Lancashire; it is conveyed by an expensive land transport, on horseback, over primitive trackways, to a vessel, in which thirty or forty thousand pounds are invested, and in which it is carried half way round the world. From the port where it arrives it is conveyed on an iron road, the construction of which has cost upwards of thirty thousand pounds per mile, by a steam carriage, costing between one and two thousand pounds, to a manufactory, in which a hundred thousand pounds have been invested, in which a thousand persons are employed, who, with the aid of a steam engine, of 500-horse power—*i.e.* steam power equal to five thousand men, continually working—keep going one hundred and fifty thousand spindles, and deliver 879,110 yards, or 499 miles of threads per minute—or, in half an hour, an extent of thread which would reach beyond the place in India from whence the material was brought, or, in the working day of ten hours, an extent of thread that, from this one spinning mill, would wrap twelve times round the world. The poor Hindoo spinner can only spin a mile of thread for about fourpence, and he can spin it for no less, for it is, at the most, a bare and wretched subsistence. But, by the combination of capital and skilled labour, a lb. (of No. 40), 33,600 yards, or more than 1

miles of thread, is made for about three halfpence. The thread, thus manufactured, is often taken to be woven, in a shed on which eighty thousand pounds of capital have been invested, in which, under a tall furnace chimney, and the unpleasant shade of a cloud of smoke,—a thousand power-looms are worked by weavers, whose wages would often purchase ten or twelve pounds of rice a day, and that, too, brought from India. The average wages earned by the weavers in these power loom factories,—of which only one-fourth are male adults, the rest being young females,—are now upwards of eleven shillings a week.

“Chiefly in yarn, but now, to an increasing extent, in cloth, the manufactured product is carried back again half way round the world, and the poor rice-fed Hindoo weaver, as well as the spinner, is undersold; he is obliged to strike his loom, and often, be it observed, seek service, as a Sepoy, in fighting, for better pay and subsistence than could ever be obtained under his native princes;—to maintain the domination of the native by whom his ancient craft has been superseded; under which domination, it may be added, if administrative reform should prevail at its seat, and secure properly qualified and conscientious colonial administrators,—that wretchedly-paid labour will be found to have been superseded to the advantage of his race, to which, with security and justice, will be given abundance and material comfort unknown before in that part of the globe.

“Another branch of manufacture, that of machine-wrought lace, may be referred to as illustrative of the tendencies of the progress of manufacturing improvements which I have endeavoured to point out in respect to the manufacture of cotton yarn and cloth.

“An eminent Nottingham lace merchant, Mr. W. Felkin, has stated that with dexterity the knitter on the pillow might weave about five meshes a minute, and would occupy 600 hours of labour to make a square yard of plain lace. In 1810 the lace-making machines at Nottingham, then 36 inches wide, made 1,000 meshes in a minute, or a square yard in two hours. Now in 1856 the plain lace-making machine is 180 inches wide, makes 40,000 meshes in a minute, or a square yard in five minutes. In 1809-10, the finished pieces of plain net were sold at five pounds the square yard; in 1850, a period of depression, at fourpence, and now in 1856 at sixpence the square yard. As in the cotton trade, at first, when the supply was considered a luxury, and was made to hundreds, instead of to many thousands of consumers, the wages were very high, and may be treated as exceptional, for they subsequently fell severely low. In 1836, when the price of plain net had fallen to 10d. per yard, the wages paid for embroidering and finishing the lace were estimated at £350,000, divided amongst 35,000 hands. Now it is estimated that £2,200,000 in wages alone are divided amongst 130,000 hands engaged in that department of the Nottingham lace trade. In 1836, there were 3,800 bobbin-net machines, returning £2,212,000; in 1856, 35,000 larger machines, returning about £3,680,000. The returns of the entire lace-making trade are now stated at £4,040,000, of which the raw materials cost £980,000, leaving to be paid in wages, interest, wear and tear, and profits, £3,060,000. The entire number of hands is now stated at 135,000. The rate of wages on the machines for making plain lace has risen from 12s. to 16s. per week for boys, and from 20s. to 24s. per week for men. The wages for men to work the fancy lace machines have risen in larger proportion, or from 20s. to 30s., and from 25s. to 50s. per week, according to the class, skill, and attention to the work to be performed.

The plain lace now serves as the basis of varied patterns, wrought by hand, but it appears that every “useful” mesh, that is to say, in the manufacturing sense, every saleable hand-wrought mesh, is now imitated by machinery, where the numbers saleable of the same pattern make it worth while. Roman Catholic priests

have adorned themselves with costly lace vestments, and have celebrated their rites before altars decorated with gorgeous lace cloths, imagining them to have been wrought in nunneries, or by the faithful of the Roman Catholic flock, but the labour of those poor Roman Catholic pillow workers, toiling at their five meshes a minute, for wretched wages—as shown in your statistical returns—wages which rendered unnecessary the prohibition of meat on the Friday, and which made their whole life one perpetual and forced fast, is now extensively superseded by Nottingham machine-made vestments, produced at the rate of a thousand meshes a minute, by fifty or even sixty shillings a week workers, to whom, or to whose families, fasts, forced or voluntary, are now unknown.

“The price of the Jacquard or fancy lace weaving machines, which are machines of the highest order of skill, is from £500 to £1,000 each or more. In respect to this new machine, a manufacturer made a statement to me to this effect, which will illustrate the general tendency of improved machinery:—“For working inferior and rude machines almost any man may be taken out of the streets and employed, at low wages without asking who he is, and on any slight stoppage he may be dismissed at once without care,—but not so with this improved machinery. It is a highly delicate and valuable property; it is a large amount of capital to put into one man's charge; a drunken or an ignorant man may in a minute do great damage; moral character and trustworthiness must now be sought for; inquiries as to these qualities must now be made before engagement; higher wages must now be paid for working the improved machine to workmen of higher character as well as of skill. When engaged they cannot be summarily dismissed with safety, for a substitute may not be found without great trouble: moreover, the wear and tear and interest on the machine is at least £1 per diem, and there is, therefore, a penalty to that amount on the owner of the machine for every day he omits to find work and keep the artisan employed at these high wages. Under these circumstances the owner becomes, to a greater extent than may be supposed, the servant of the operative.

“The place of rude hand labour is, in the first instance, often only supplied by rude machine labour, but as machinery is improved, the economical condition of the labourers is everywhere, and must, I apprehend, continue to be, improved with the character of the machinery.

“In the immediate vicinity of the lace machine trade there was the stocking manufactory with machines of an inferior character. Ten years ago, the wages were the most deplorably low of any I have met with in the manufacturing districts of England, as they were not more than from 5s. to 10s. per week clear wages. I am glad to learn that now, as a consequence of the introduction of the rotary circular stocking machine, the wages of the work-people have been raised from 10s. to 20s. per week, and that for fewer hours of labour, and that labour of a lighter character.

“As a general rule, we must anticipate that all labour which consists of repetitions of motion by hand will be executed by machinery. Sewing machines appear to be making way, and are substituting, at the least, double wages for the wretched wages formerly obtained by sempstresses. I have seen shoes of a superior appearance made in less than one hour each pair, by a new machine, which will, I am assured, substitute better-paid labour for the common manual labour. It is to be hoped, for the sake of humanity, that machinery will be brought to bear in quarrying and mining operations, especially in those for the extraction of coal.

“The like elements in the progress of improvements in machinery and in processes, requiring more and more of machinery or capital to be put under one management, and more of skill and responsibility on the part of the workers, noticed in respect to the lace-making machine, are in a degree displayed in the progress of the cotton manufacture, and chiefly account for the steady in-

crease of wages already stated. And these elements have hitherto been actually most strongly developed in the cotton manufacture in England during periods of manufacturing depression.

"The periods of manufacturing distress have, heretofore, been the chief periods of improvement to the labouring classes themselves. It was an aphorism of the father of the cotton manufacture in England, Mr. John Kennedy, of Ardwick-hall, recently deceased, whose first spinning was by hand—then by a machine worked by a donkey—then by a horse—then by a Newcomen's engine—and, lastly, by a Watt of 500 horse-power, and who had taken part in all the vicissitudes of the cotton manufacture from its commencement, that latterly no extensive improvement was made in the manufacture, except in periods of *threadbare profits*. At those periods, when demand is slackened, when prices fall, the manufacturer is driven to consider and execute whatever improvements he or others can devise, by which the expense of production may be reduced, and his profits be maintained at the reduced price of the market. If he have steam-power looms, he finds out that two looms, now superintended by two men, at 11s. per week wages, may be superintended by one man. But that one man must be the most clever workman, and, having so much additional machinery under his charge, he must, moreover, be a trustworthy one. Such a workman cannot at once be got from the common labour market; or, even if he were got under the pressure of the most intense and general distress for the time, he certainly would not be got to keep up an interest so as to enable him to continue such important work at the present miserable rate of wages of the less skilled labourer. In actual practice, however, wages are raised in the mode stated, and he gets one half more wages in the midst of a market depressed by redundant hands. In the spinning machinery, it is found that one man may be made to superintend the working of more spindles, or else the speed of the machinery is increased. In weaving, more cloth is turned off in the hours, now reduced to 60 a week, than was formerly turned off in 76.

"I found, on investigation, the term self-working machinery delusive; that, although a self-acting mule, as it is called, might be worked by a young person, at 9s. or 10s. a week wages, yet the manufacturer finds it worth while to give 18s. a week for the qualities of labour and superintendence most safe and productive. I found, also, that with apparently self-acting machinery, there were very large differences between one day when the workmen worked "with a will," and another when they were indifferent, which fact formed one ground, amongst others, for my supporting a reduction of the working hours of labour, in the confidence that by greater attention and energy within the reduced time, the quantity of work would be made up; and this confidence has been justified by the event, but it has required increased skill and attention. From the most impartial testimony which I have been able to obtain, I am led to believe that Lancashire has less to fear than ever from the low-priced and unrestricted labour and long hours of the cotton manufacturer of other countries.

"An eminent cotton-manufacturer in Austria, who uses the most improved English machinery, assures me that, with the labour there of thirteen hours and more per diem, he does not get more produce turned off than is turned off in ten hours and a half in Manchester. The late Mr. Bourcart, an eminent cotton manufacturer at Alsace, assured me that, if he were merely to regard his manufacture as an investment, and he were to begin the world as a manufacturer, he would, for the sake of the more active and skilled labour, set up his mill in Lancashire. The chairman of a committee of woollen manufacturers at Leeds, sent on the occasion of the Great Exhibition of 1851, to examine the works of the competitors whom they would have to meet, stated to me,

that the best were to be found in Belgium, but that, although he paid one-third more wages in Yorkshire, he got his yard of cloth of the like quality as cheaply made there as the Belgian masters did with their labour.

"The like tendency to those above described, of putting more and more of machinery, that is, more and more of capital under the care of one person, requiring higher qualifications, and insuring higher pay, has been displayed in other branches of manufacture than those of textile fabrics; thus in machine working, at a period of distress, it was found out, that instead of two planing machines being superintended by two men, at 16s. or 18s. per week wages each, those machines might both be superintended by one man, at 24s. per week.

"The painful impressions created by the spectacle of manufacturing distresses and the troubles attendant upon them, which have perplexed statesmen of the older school, and made them wish we were without these new manufactories, and hope that the experience of the last reverses will at least have served to give them a decided check—have not been effaced, when returns are received, showing large investments of capital in new establishments, and the great numbers of additional population which will be required to work them, which facts are received as proving an astounding recklessness of speculation. On inquiry, however, I have always found that the capitalists knew best what they were about, and that the investment, instead of being more dangerous, was in reality more safe than ever.

"The economical sequence has appeared to me to be as follows:—

"Long depressed markets have necessitated the consideration and adoption by the manufacturer of improvements in processes and machinery by which the cost of production is lowered to meet the fallen demand.

"These improvements have necessitated for their execution improved labour at improved wages.

"The reduced price rendered possible by the reduced cost of production, has brought the commodities within the reach of greater numbers, and has stimulated and extended the habitual consumption.

"The restored and extended demand, has in the case of articles of what may be deemed primary necessity for civilised life, been from a higher to a lower class of consumers, who are the least affected by the fluctuations of fashion, or disposed to sudden changes of habit; and hence the consumption is placed upon a wider and firmer basis, rendering employment at the improved wages less liable to extreme fluctuations.

"The improvements in processes and machinery which have occasioned a demand for improved labour, are attended with the additional security to the operative, that they compel the manufacturer to resort rather to short time and struggle to the last before he stops his works, for if he once disperses his whole establishment he may not again get such another together, and on such occasions, he often finds himself in this position, that whilst he manufactures without a profit or even at a loss, he will incur more loss by the deterioration which his machinery undergoes when stopped than by keeping the works going.

"One circumstance which, on the occasion of the depression of cotton manufacturers, constitutes an element of future extension, is this, that the old established home market is the last in which the manufacturer will reduce his previously settled prices; to avoid disturbing them so long as he can help it, he prefers making sacrifices, selling his goods in any out of the way or strange market, unknown to the common home trade;—then young men tempted by the low price of goods, take cargoes of them as ventures to China, or elsewhere, and lay the foundations of new demands. Then too, with the aid of a man, which my friend, Mr. Senior, in his lecture on political economy at Oxford calls 'the great corrector of mischievous legislation, the smuggler,' customs barriers are broken down with the low-priced goods,

and incursions are made in the districts where prices are kept high and consumption is checked, by protective legislation.

"Whilst wages from the causes stated have been improved, and must, I believe, from those causes be maintained, the manufacturer's profits, from the competition of new capital, induced by the greater safety of investments consequent on the extended demand, have been reduced.

"At present the general average profits on capital applied to manufactures are understood to be below 10 per cent., or about $7\frac{1}{2}$ per cent., which is understood to be about the rate of profit obtainable by investments in improved and skilfully conducted agriculture. As an example of the progress in respect to the profits of manufacturers, it may be mentioned that the first Sir Robert Peel, whom recently living people remembered to have seen as a poor boy carrying milk, made his large fortune by printing pieces of cotton at a guinea each piece, and at the time I was last in Lancashire that same description of pieces was under manufacture in large quantities for exportation to India—material, weaving, cloth, printing, and all—at half the price which he obtained for printing alone.

"The proportions of bankruptcies to the capital employed, and of the stoppages of works, have really diminished with the extension of the manufactures in question. Formerly, in the earlier stages of manufactures, and in the narrower fields of consumption, the fluctuations chiefly arose from the caprices of fashion; now they are dependent chiefly on the larger causes affecting populations, bad harvests, epidemic seasons, national disturbances, threats of war, mal-administration, and unproductive war taxation.

"On the announcement of projects to introduce new machinery, immediate apprehensions are entertained of its effects on those whose labour is superseded. Economists, who are advocates for the use of machinery, urge in mitigation of its assumed effects, that its introduction is necessarily gradual. Entertaining such apprehensions myself, I was early prepared to consider, in poor law administration, measures of a special character for the relief of the labourers whose services had been discontinued by the introduction of labour-saving machinery.

"In investigating the administration of relief in England, I looked with particular interest on some fields of extensive improvement in machinery and processes, for the destitute labourers and their families, who, as it might fairly be anticipated, must have been reduced to pauperism by such improvements, but, as a class, there was nowhere a trace of them, and the existence of particular cases from that cause on the pauper rolls was extremely doubtful. In one instance, where, by the introduction of Mr. Whitworth's street-sweeping machine into one large town district, the labour of the entire body of the sweepers by hand had been displaced, I confidently expected that that class, at least, who were of the lowest labourers, and the least capable of changing the object of their labour, would be found, as a class, on the destitute relief list; but, as a class, they were not there, and having obtained a list of them, I directed inquiries to be made into the individual cases, as to what had become of each of them. About 8 per cent. of them had died. Considering the class, many of whom were old and feeble, this, for the time, was not a mortality beyond the average. Of about six per cent. of them no account could be got, but the rest had found other, and on the whole actually better paid work. Under the stimulus of an extraordinary necessity, they had found out for themselves miscellaneous services, for which, under that stimulus, they qualified themselves,—which services no one else could have anticipated or found out for them:—some had become stokers or firemen for steam-engines, some had become machine-drivers, some had entered the police, and none had fallen below their former position, which

indeed was scarcely possible. To the whole of those who had gained employment, the privations and even the severities of the displacement appeared clearly to have been compensated. I have directed inquiries into other and larger displacements of labour, with similar results. To have provided any special and indulgent relief in order to graduate the changes, would have lowered the stimulus under which the new benefits to themselves were achieved, and would have simply done mischief. With the like care that a surgeon has for the safety of a patient, in resisting interference with the operations of nature, I have resisted interference by special doles or allowances of public relief; with this economical, absorbing process, and with the stimuli to exertions natural to such occasions. I could display the effects of well meant but ill-informed interference in such cases in occasioning much severe and protracted suffering. The cases of the retention of partial employment by relief in aid of wages in a contest with steam power, as by hand-loom weavers against steam-power loom weavers for common goods, were of severe and protracted misery.

"Thus, amongst the economical results displayed of the improvements in processes and machinery are these, that, where labour is saved, or rendered more productive thereby, capital is increased: and the increased investment of capital increases the demand for labour, and thence increases what I call the absorbent power of the labour market, to re-absorb the displaced labour. And to meet these changes sound education is advantageous, as increasing the aptitudes of labourers to learn new employments.

"In the consideration of the future of our manufactures, I may state that I have at times directed particular inquiries to be made in respect to the consumption of manufactured goods in Great Britain.

"At a time when there was much suffering amongst the stocking weavers of Leicester and Nottingham, in consequence of a reduction of demand, there were loud outcries and allegations of over-production. It appeared, however, that if all the stockings then manufactured were consumed in the United Kingdom (and a very large proportion of those manufactured were exported), the supply would scarcely amount to one pair of stockings per annum per head of the population. The great bulk of the labouring population of Ireland, Scotland, and Wales, were without stockings; the adult labouring population of England and their children were very imperfectly supplied with them. It is a fact to be noted by the way that those who wear shoes without stockings, do not save by the privation, for the shoes wear out the faster. In our own colonial possessions, there are large proportions of the population who only wear a sort of moccasin, or prepared skins, as shoes or stockings. I have also directed particular inquiries to be made as to the consumption of cotton, linen, and other materials of clothing by our population. I found large classes of work-people in receipt of such wages as from 18s. to 24s. per week, who had only two shirts each, one on and one off; many of them had only one shirt, which they wore until it fell to pieces. Taking the clothing in use for the poor maintained in public establishments as the standard of necessity, our own labouring population is even now, speaking generally, very poorly clad, and there might be, even at the present prices, an extended home consumption, but there is still great room for improvement in the qualities of manufactured articles and their fitness for use, for warmth, lightness, cleanliness, durability, and ornamentation, as well as cheapness, to bring them still more within the means of all. If, in England even, there is room for a considerable extension of the consumption of manufactured articles, and consequently for the extension and improvement of the manufactures, and, consequently, for the improvement of the condition of the artizans, much more so is there in other countries. At the time of the English exhibition

of the Industry of all Nations, I was in communication with members of local committees of manufacturers, who, for the first time, went upon the continent to examine the manufactures with which they would have to compete. One general conviction expressed to me by several of them on their return was, that there was abundant room in each country for extended consumption within itself, and for the further development of its own manufacturing industry if it thought fit, without any injury to any other. And looking at the primary necessities of populations, I believe that the field for an extended consumption of manufactured goods is much larger than is yet conceived, even by manufacturers.

The elements of the progress here indicated are, it is to be observed, mainly economical elements. The physical, educational, and social elements are, for the most part, essentially distinct, and these, when pourtrayed in their present condition, present sadly reversed pictures, dreadfully wide-spread evils, but, when they are closely examined, these will be found to be, in a great measure, preventable by improved legislation and improved administration."

He then proceeded to give illustrative instances to show that the introduction of improved machinery and processes into agriculture, was attended with similar economical results, tending to the improvement of the wages of the labourer.

Proceedings of Institutions.

FALKIRK.—On the 29th ult. the session of the Falkirk School of Arts was opened by an address from the Lord Advocate. Upwards of a thousand persons were present. The right hon. gentleman was accompanied to the platform by Robert Adams, Esq., Provost of Falkirk; Sheriff-Substitute Rose'ton; the Rev. Lewis H. Irving, minister of the Free Church; Mr. Macfarlane, of Thornhill; Mr. Wilson, of Bantaskine; Mr. James Russell, jun., of Arnottdale; Dr. Hamilton; Mr. Wilson, writer; Bailie Patrick Gentleman; Mr. John Gentleman; Mr. Charles Scouller, of the Falkirk brewery; Captain Speirs, of Culcreuch; and other gentlemen interested in the School of Arts and in the locality. The chair was taken at a quarter past eight o'clock, by Provost Adam, who introduced the Lord Advocate in a complimentary speech. The Lord Advocate said, that he should have felt it an honour to be asked to address a school of arts in any circumstances; but looking at this Institution as one of the very foremost in the race of knowledge and progress which has been going on at such speed for the past twenty years, and considering that it dates so far back as twenty-nine years ago, he felt the greatest possible pleasure in obeying their summons on this occasion. His lordship, after enlarging upon the advances made in civilisation during this period, and the increased appreciation shown to such Institutions as this, said he had been led into reflections on the spirit of nationality by the numerous historical associations connected with the town of Falkirk. He then proceeded to make some remarks on the national character, position, and history of Scotland. After reviewing the character of Geo. Buchanan and other great men belonging to their past history, his lordship proceeded to show, from the literature of both countries produced during the reign of Elizabeth, that there was then no difference in the dialects of England and Scotland. He then touched upon that feature in Scottish history which rose superior to all other national events, namely, the Reformation. His lordship pronounced a warm eulogium upon the devotion which the commonality of Scotland had ever displayed—in the time of Wallace, when deserted by the nobles, and subsequently, both at the Reformation and during the ecclesiastical troubles. Coming to the Union, he gave a graphic picture of the

new phases which it developed in the career of the Scottish courtier. After eulogising the memory of Henry Dundas and the Scottish Jacobites, his lordship glanced at three names as typical of Scotch character during the last century. The first, Duncan Forbes, of Culloden; the second, David Hume, who was emphatically the man of the last century, and the third, Robert Burns, who had preserved in a classic form, that language which bade fair to pass into a barbarous jargon. He likewise briefly alluded to the great cause of education, particularly the amelioration of the great masses of people which our commerce and manufactures had brought together.

MEETINGS FOR THE ENSUING WEEK.

MON. Architects, 8. Part II. "Description of the works executed and now in progress at Alnwick Castle, Northumberland."

Chemical, 8. Mr. E. O. Brown, "On a New Volumetric Method for the Determination of Copper."

TUES. Civil Engineers, 8. Adjourred discussion upon Mr. D. K. Clark's paper "On the improvement of Railway Locomotive Stock."

Linnæan, 8.

Pathological, 8.

Statistica', 8. Rev. John Clay, "On the relation between Crime, Popular Instruction, Attendance on Religious Worship, and Bee-holes."

WED. Society of Arts, 8. Colonel Sykes, F.R.S., Chairman of Council, "Address on the opening of the One Hundred and Third Session."

Geological, 8. Dr. Buist "On the Occurrence of Crystallization in Stucco, and on other instances of changes in Molecular Arrangement." 9. Professor James Nicol "On the Red Sandstone and Quartzite of the North-west of Scotland."

THURS. Antiquaries, 8.

Philological, 8.

Royal, 8^½.

SAT. Royal Botanic, 3^½.

Medical, 8.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From *Gazette*, November 7th, 1856.]

Dated 15th July, 1856.

1634. Arthur Neild, Manchester—Improvements in Jacquard and other pattern looms. (A communication.)
Dated 1st August, 1856.

1822. John Avery, 32, Essex-street, Strand—Improvements in bonnets and other coverings for the head. (A communication.)
Dated 6th August, 1856.

1858. James Braby, Borough Haymar' et, Newington Causeway—Improvements in sawing machinery.
Dated 24th September, 1856.

2234. Antoine Jean Baptiste Espinasse, Toulouse—Improvements in the means of obtaining motive power.
Dated 25th September, 1856.

2246. Henry Joseph Marie Edouard Silvy and Amedée Anne Henry Plagniol, Paris—Improvements in harness.
Dated 15th October, 1856.

2408. Edward Wallen, Cornwall-road, Lambeth—Improvements in the construction of chairs, sofas, bedsteads, and similar articles of furniture to sit or recline upon.
Dated 21st October, 1856.

2464. Charles Briqueler fils, 22, Rue Emery, Dunkerque—The purification, clarification, and decoloration of the cotton seed oil.

2466. John Cowdery Martin, Fern-cottage, Charlewood-road, Putney—An improvement in glazing paper.

2468. Peter Armand le Comte de Fontainemoreau, 39, Rue de l'Echiquier, Paris—An improved knitting loom. (A communication.)

2470. William Smith, 10, Salisbury-street, Adelphi—Improvements in water level and pressure indicators and lubricators. (A communication.)

2472. Robert Davison Atkinson, Kingston-upon-Hull—Improvements in preparing and coating metallic surfaces. (A communication.)

2474. George Thomson, Westbourne-green, Harrow-road—Improvements in machinery for cutting or rending wood for laths and other uses.

2478. George Webster and James Webster, Fountain-yard, Bridge End South, Leeds—Improvements in the means of opening and closing the slide valves of engines worked by steam or other power.
Dated 22nd October, 1856.

2480. Godfrey Ermel, Manchester—Certain improvements in machinery or apparatus for the finishing and treatment of yarns or threads.

2481. Frederic Walton, Haughton Dale Mills, near Denton, Lancashire—Certain improvements in the manufacture of brushes.

2482. George Chappell Potts, New Oxford-street—The application of certain materials to the cleaning of casks.

Dated 23rd October, 1856.

2483. Charles Weightman Harrison, Woolwich—Improvements in the insulation and protection of electric conductors.

2484. Thomas Gray, Ratcliff-works, Rose-lane, Stepney—An improved drying apparatus.

2485. John Francis Porter, 11, Park-street, Westminster—Improvements in the manufacture of bricks and other articles of clay and brick earth, or of the like materials.

2487. John Christian Bremer, 166, Fenchurch-street—Improvements in propellers.

2488. John Macdonald, 13, Henry-street, Upper Kennington-lane, Vauxhall—Improvements in regulating the supply of oil or other liquids, applicable to lamps, gas meters, and other useful purposes.

2489. Nehemiah Brough, Birmingham—Improvements in dress fastenings.

2490. Albert Demerit Bishop, Woolwich—Improved apparatus for facilitating the finding and raising of vessels and submerged articles.

2491. Theophilus Horrex, South-square, Gray's-inn—Improvements in fastening buttons and other similar articles on to garments and other things.

2492. John Walley, Derby—Improvements in the means of preventing explosions in steam-boilers.

2493. John Dearman Dunncliff and Walter Dexter, of Hyson-green, Nottingham—Improvements in warp machinery.

2494. Leonard Alexander Desachy, Great Marlborough-street—Improvements in producing architectural mouldings, ornaments, and other works of art formed with surfaces of plaster or cement.

2495. Edward Allan Athawes, 63, Blackfriars-road—An improvement in the construction of forks for forking land.

Dated 24th October, 1856.

2496. James Eglington Anderson Gwynne, Essex-wharf, Essex-street, Strand—Improvements in the manufacture of carbon or charcoal powder for various useful purposes.

2497. Isaac Bailey, Bradford—Improvements in machinery for spinning wool, cotton, alpaca, mohair, and other fibrous articles.

2498. George White, Bromley, Middlesex—An improvement in the treatment of grain, in order to produce starch and spirit therefrom.

2499. Richard Archibald Brooman, 166, Fleet-street—An improved oil for burning in lamps and an improved burner and chimney. (A communication.)

2500. William Woodford, Taunton—The prevention or cure of smoky chimneys.

2501. Robert Struthers, Holyhead—Improvements in machinery or apparatus for transmitting motive power.

2502. William Mills, Congreve-street, Birmingham—Certain improvements in apparatus for cleansing or removing the soot from chimneys.

2503. Howard Ashton Holden, Bingley-hall Works, Birmingham—Improvements in furniture for railway and other carriages, and which said improvements are also applicable as a means of finishing or ornamenting the iron parts of harness and other articles made of iron to which such mode of finish or ornamenting has not heretofore been applied.

2504. Louis Auguste Mangin, 39, Rue de l'Echiquier, Paris—A self-acting door-spring.

2505. Samuel Baxter, Minories—Improvements in chain wheels, or barrels and stoppers to be used for raising and lowering weights by means of chains.

2506. Charles Anciaume, 15, Quay Bourbon—Improvements in musical organs, both sedentary and portable.

Dated October 25th, 1856.

2507. Gustavus Ernst and William Lorberg, Manchester—An improved mode or method of raising or producing designs, patterns, or impressions on the surfaces of plates, blocks, or rollers, and transferring or imparting the same to paper, parchment, woven fabrics, leather, or other similar materials.

2509. Charles James Farrington and William Comber, Hampstead—Improvements in means or apparatus for giving alarm in case of attempted burglaries.

2511. George Henry Bachofner, Upper Montague street—Improvements in glass shades for gas and other artificial lights.

2513. Henry Forfar Osman, 33, Essex-street, Strand—An improved contrivance for distending the skirts of ladies' dresses, and preserving the required form and shape thereof. (A communication.)

Dated 29th October, 1856.

2534. Richard Robinson, Eccles New-road, Pendlebury, Lancashire—An improvement or improvements in machinery or apparatus for sizeing, dressing, finishing, and polishing yarns or threads.

2536. Thomas Garnett, Low Moor, Clitheroe, Lancashire—Improvements in the manufacture of paste or size for sizing, stiffening, or otherwise preparing cotton and linen yarns and woven fabrics.

2538. Louis Adolphe Faure, Paris—An improved pump.

2540. Thomas John, Pesth, Hungary—A new electric telegraph apparatus for writing.

2542. Arthur James Thompson, Birmingham—An improved gum-pot and brush, and which said pot and brush are also applicable for holding and using liquid glue, paste, or other adhesive materials, as well as varnish, paint, and such like fluids, which are liable to dry up by the action of the air.

2544. Charles De Jongh, Lautenbach, near Guebwiller, France—An improved method of and machinery for combing and preparing silk, flax, and other fibrous substances.

2546. Frederic Whitaker, 4, Canonbury-road—Improvements in apparatus for supplying water to steam boilers.

2548. David H. Whittemore, Worcester, Massachusetts, U.S.—An improved machine for paring, slicing, and coring fruit or vegetables.

Dated October 30th, 1856.

2550. William May, London—Improvements in steam engine indicators. (A communication.)

2552. Henry Holcroft, 39, Rue de l'Echiquier, Paris—An improved steam-engine, specially applicable to agricultural operations.

2554. James Simpson and Henry Spencer, Rochdale, Lancashire—Improvements in lubricating steam engines.

WEEKLY LIST OF PATENTS SEALED.

Sealed November 1st, 1856.

1100. Louis Beauche. *Sealed November 11th, 1856.*

1101. George Simpson. 1141. Charles Henry Olivier.

1105. Richard Archibald Brooman 1153. Charles Richard Williams.

1142. Charles Gibson. 1157. Matthew Townsend.

1146. John Cox. 1176. Richard McCloy and John Hare.

1158. William Marychurch and John Griffiths. 1178. George Carter.

1218. Alexandre Hubert. 1212. Thomas Lawrence.

1228. James Howard and George Williams Baker. 1229. Thomas Dawson Russum.

1246. Robert Adam Whitlaw and Alexander Mitchell, jun. 1251. Andre Adolphe Gaget.

1256. Bennet Johns Heywood. 1296. Robert Blackwood, sen.

1282. John Weems and John Henderson McCrindell. 1310. Edward Marsden.

1416. Joseph Sutcliffe and James Leech. 1318. John Henry Johnson.

2046. Edmund Pim Spiller. 1406. Peter Armand le Comte de Fontaine-moreau.

2056. Eugene Armand Roy, John Archibald Hall, and William Thomas Binns. 1600. George Bradshaw Watkins.

2162. Alfred Nicholson Wornum. 1644. Alfred Nicholson Wornum.

1988. Edward Alfred Cowper. 1988. Edward Alfred Cowper.

2027. Thomas Pinfold Hawkins. 2027. Thomas Pinfold Hawkins.

2162. Alfred Vincent Newton. 2162. Alfred Vincent Newton.

PATENTS ON WHICH THE THIRD YEAR'S STAMP DUTY HAS BEEN PAID.

November 3rd.

2547. Peter McGregor. 2785. John Hewitt.

2567. William Foster. 2614. William Steel.

2670. John Banks Nicklin. *November 6th.*

2613. Richard Dryburgh. 2581. Marino Louis Joseph Chri-

2648. Joseph Fry. 2686. tophe Vincent Falconi.

2694. John Gerald Potter and Robert Mills. 2710. William Mee.

2742. Davidson Nicholl. *November 7th.*

2749. John Henry Johnson. 2671. Robert Griffiths.

2754. John Henry Johnson. 2757. Joseph Stenson.

2841. Lewis Harvey Bates.